



UNITED STATES PATENT AND TRADEMARK OFFICE

9m  
UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/914,293	11/06/2001	Yuji Fujimori, Suwa-Shi	110443	4030

7590 11/15/2002  
Oliff & Berridge  
PO Box 19928  
Alexandria, VA 22320

EXAMINER

TRAN, TAN N

ART UNIT	PAPER NUMBER
----------	--------------

2826

DATE MAILED: 11/15/2002

13

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/914,293

Applicant(s)

FUJIMORI ET AL.

Examiner

TAN N TRAN

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on amendment filed on 10/03/02.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 25-30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10 and 14-22 is/are rejected.
- 7) ☒ Claim(s) 11-13, 23 and 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### DETAILED ACTION

1. Applicant's restriction requirement in amendment filed on 10/03/02 with traverse of Group I, claims 1-24 in Paper No. 12 is acknowledge. The traversal is on the ground(s) that "this application is a national stage application based on an international PCT application. Restriction practice under 35 U.S.C. 121, as it applies to national stage application submitted under 35 U.S.C 1.11(a), is not applicable to either international or national stage applications. National stage applications based on international PCT application must be examined under uinity of invention requirements of the PCT as set forth in 37 C.F.R 1.475 and 1.499". These are not found persuasive because:

a/ The restriction / election requirement mailed on 5/3/02 has been withdrawn due to the examiner's error that the restriction is required under 35 U.S.C. 121. The corrected restriction/election requirement has been set forth below.

b/ Restriction to one of the following inventions is required under 35. U.S.C. 121 and 372.

This application contains the following groups I and II of inventions which are not so link as to form a single general inventive concept under PCT Rule 13.1.

I. Claims 1-24, drawn to a semiconductor device, classified in class 257, subclass 449.

II. Claims 25-30, drawn to a semiconductor device, classified in class 136, subclass 256.

Inventions II and I are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particular of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations. In the instant case, the combination as claimed does not require the particular of the subcombination as claimed because the solar cell unit can use any solar cell. The subcombination has separate utility such as the solar cell can be used in any photoelectric conversion.

c/Additionally, the search is not coextensive as evidenced by the different fields of search for two products as cited in the previous restriction requirement.

d/ Since applicant has received an action on the merits for the original presented invention, this invention has been constructively selected by original presentation or prosecution on the merits. Therefore, the election requirement is made final.

### **Claim Rejections - 35 USC § 102**

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 1-4,9,10 are rejected under 35 U.S.C. 102(e) as being anticipated by Mikoshiba et al. (6,384,321).

With regard to claim 1, Mikoshiba et al. discloses a pair of electrodes (2,6); and a titanium dioxide semiconductor 3 which is disposed between the electrodes (2,6), the titanium dioxide semiconductor 4 having a fractal structure and defining a surface and an interior, the surface of and the interior of the titanium dioxide semiconductor 4 being formed with pores. (Note lines 14-16, column 19, fig.1 of Mikoshi et al.). It is inherent that titanium dioxide semiconductor 4 of Mikoshi et al. being arranged so as to form a rectification barrier with respect to at least one of the pair of electrodes (2,6), because an energy height corresponding to the difference in the work function between the titanium dioxide semiconductor 4 and the electrodes (2,6) is formed in the interface therebetween, thus forming rectification barrier.

With regard to claims 2,3,4, it is inherent that the rectification barrier is formed by contacting the titanium dioxide semiconductor 4 with at least one of the pair of electrodes (2,6), the rectification barrier is the shottky barrier being formed by contacting the titanium dioxide semiconductor 4 with at least one of the pair of electrodes (2,6), and the rectifier barrier is the PN junction being formed by contacting the titanium dioxide semiconductor 4 with at least one of the pair of electrodes (2,6), because an energy height corresponding to the difference in the work function between the titanium dioxide semiconductor 4 and the electrodes (2,6) is formed in the interface therebetween, thus forming rectification barrier.

With regard to claim 9, Mikoshiba et al. discloses the titanium dioxide semiconductor 4 is porous and has the fractal structure. (Note lines 14-16, column 19, fig.1 of Mikoshi et al.).

With regard to claim 10, Mikoshiba et al. discloses the at least one of the pair of electrodes (2, 6), with which the titanium dioxide semiconductor 4 form the rectification barrier,

Art Unit: 2826

is formed from a transparent electrode made of tin oxide. (Note lines 31-32, column 18, fig. 1 of Mikoshiba et al.).

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 6-8,14-17,22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mikoshiba et al. (6,384,321).

With regard to claims 6, 7,8, Mikoshiba et al. discloses all the claimed subject matter except for the titanium dioxide semiconductor has a porosity of 5 to 90 percent or the titanium dioxide semiconductor has a porosity of 15 to 50 and 20 to 40 percent. However, although Mikoshiba et al. do not teach exact the porosity of the titanium dioxide semiconductor as that claimed by Applicant, the percentage differences are considered obvious design choices and are not patentable unless unobvious or expected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note in re Leshin, 125 USPQ 416.

Applicant's claims 14-17 do not distinguish over Mikoshiba et al. references regardless of the process used to form the electrodes and the titanium dioxide semiconductor such as sputtering, printing and subjected to visual rays absorbable processing to enable absorption of visible rays, because only the final product is relevant, not the process of making.

Art Unit: 2826

Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Fitzgerald, 205 USPQ 594, 596 (CCPA); In re Marosi et al., 218 USPQ 289 (CAFC); and most recently, In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that Applicant has burden of proof in such cases, as the above case law makes clear.

With regard to claim 22, Mikoshiba et al. disclose all the claimed subject matter except for the titanium dioxide semiconductor has oxygen defects. However, it would have been obvious to one of ordinary skill in the art to recognize that the titanium dioxide semiconductor has oxygen defects, because it has pores and fractal structure.

Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mikoshiba et al. (6,384,321) in view of Shiratsuchi et al. (6,084,176).

With regard to claim 18, Mikoshiba et al. does not disclose organic dye is adsorbed to the titanium dioxide semiconductor.

However, Shiratsuchi et al. discloses dye 4 is adsorbed to the titanium dioxide semiconductor 3. (Note fig. 1 and column 31 of Shiratsuchi et al.).

Art Unit: 2826

Therefore, it would have been obvious to one of ordinary skill in the art to form the Mikoshiba et al.'s device having dye is adsorbed to the titanium dioxide semiconductor such as taught by Shiratsuchi et al. in order to enhance the absorption light.

With regard to claims 19, 20,21 Mikoshiba et al. and Shiratsuchi et al. disclose all claimed invention, except for inorganic dye, being adsorbed to the titanium dioxide semiconductor, includes inorganic carbon, or includes an inorganic matter obtained by dying carbon. However, although Mikoshiba et al. and Shiratsuchi et al. do not teach exact the type of the dye being absorbed to the titanium dioxide semiconductor as that claimed by Applicant, the type differences are considered obvious design choices and are not patentable unless unobvious or expected results are obtained from these changes. It appears that these changes produce no functional differences and therefore would have been obvious. Note in re Leshin, 125 USPQ 416.

***Allowable Subject Matter***

4. Claims 5,11-13, 23-24 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 5,11-13, 23-24 are allowable over the prior art of record because none of these references disclose or can be combined to yield the claimed invention such as the electrode with which the titanium dioxide semiconductor forms the rectification barrier is formed in such a way as to penetrate into the surface of the titanium dioxide semiconductor and the interior thereof as recited in claim 5, the pair of electrodes, with which said titanium dioxide semiconductor forms



Art Unit: 2826

the rectification barrier, includes a solid iodide as recited in claim 11, the pair of electrodes, with which said titanium dioxide semiconductor forms the rectification barrier, includes copper iodide as recited in claim 12, and the pair of electrodes, with which said titanium dioxide semiconductor forms the rectification barrier, includes silver iodide as recited in claim 13, and the titanium dioxide semiconductor includes impurity that include at least one of Cr and V as recited in claim 23.

### Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a). A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tan Tran whose telephone number is (703) 305-3362. The examiner can normally be reached on M-F 8:30AM-5PM.

Art Unit: 2826

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (703) 308-6601. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for after final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

TT

Oct 2002

  
Minh Loan Tran  
Primary Examiner